BLACK BOX
NETWORK SERVICES

LPS1000A User's Guide

The LPS1000A media converters enable businesses to provide power to network devices over the existing CAT5 data connection. The LPS1000A AC powered PoE media converters combine data received over a fiber optic link with -48VDC power, provides power to Data Terminal Equipment (DTE) and Power Devices (PD) over unshielded twisted pair cable. These PoE converters are Power Sourcing Equipment (PSE) and are fully compatible with Powered Devices (PD) that comply with the IEEE802.3af standard. In addition, these converters have PD signature sensing and power monitoring features per the IEEE 802.3af standard.

Part Number	Port One - Copper 10/100/1000Base-T	Port Two - Fiber
LPS1000A-MM	RJ-45 100 m *(328ft.)**	SC, 1000Base-SX, 850 multimode 62.5µm: 220m *(722ft)* 50µm: 550m *(1804ft)*
LPS1000A-SM	RJ-45 100 m *(328 ft.)**	SC, 1000Base-LX, 1310 single mode 10km *(6.2 miles)*
LPS1000A-1SFP	RJ-45 100 m *(328 ft.)**	100/1000Base-X SFP slot *(empty)*
LPS1000A-2SFP	RJ-45 100 m *(328 ft.)**	(2) 100/1000Base-X SFP slots *(empty)*

*Cable distances are the typical maximum cable distance. Actual distance is dependent upon the physical characteristics of the network installation.

Mounting options *(sold separately)*

Part Number	Description
LPS1000-Wall	Wall Mount Bracket
LPS1000-DINRAIL	DIN Rail Mtg. Bracket

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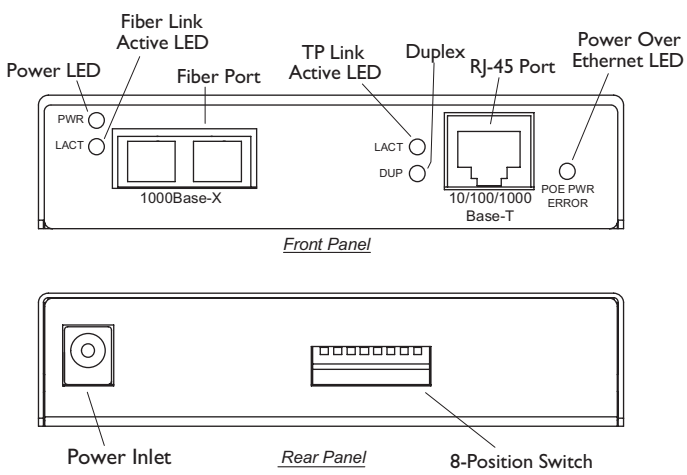
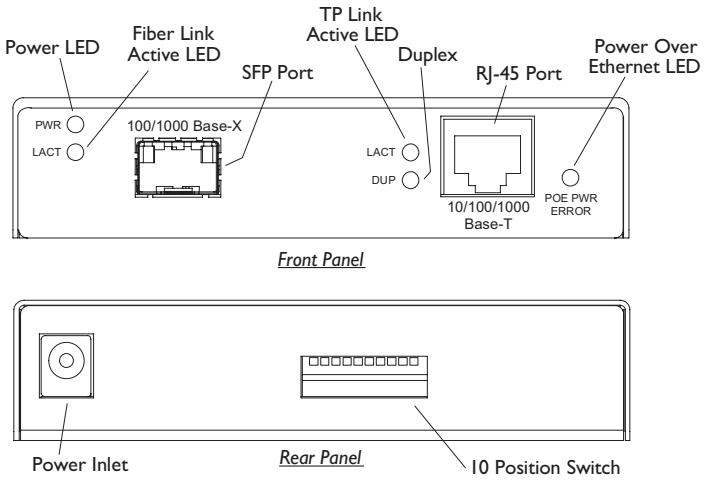
Product Description & Features

Description

LPS1000A-MM/-SM



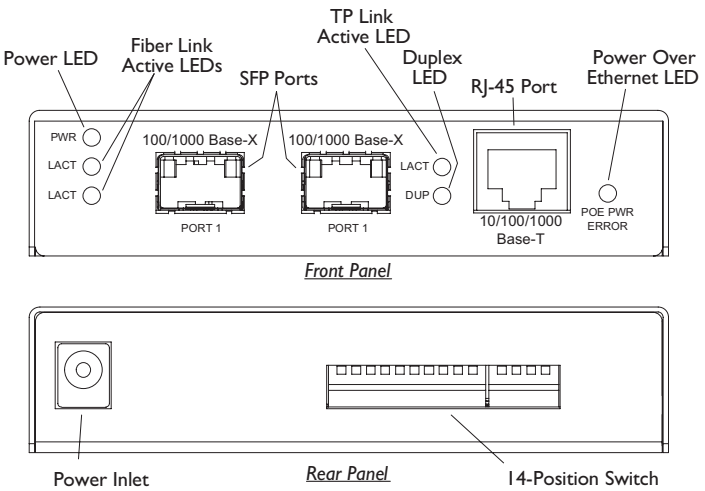
LPS1000A-1SFP



Product Description & Features -- Continued

Description -- continued

LPS1000A-2SFP



Product features

AutoCross

The AutoCross™ feature allows either straight-through (MDI) or crossover (MDI-X) cables to be used when connecting to 10/100Base-TX devices, such as wireless access points, VoIP phones, network cameras, etc. AutoCross determines the characteristics of the cable connection and automatically configures the unit to link up, regardless of the cable configuration devices.

Automatic Link Restoration

Black Box converters will automatically re-establish link in all network conditions:

- Without a device reset, the converters will automatically re-establish the link when connected to switches after a link loss.
- With Auto-Negotiation enabled, automatic link restoration allows using Auto-Negotiation with Link Loss Notification.
- With Link Pass-Through enabled in both directions, automatic link restoration allows using Link Loss Notification in both directions.

Auto-Negotiation

The Auto-Negotiation feature allows the media converter to bring up the copper link to the highest speed and mode possible for all the attached network devices.

Single Pair Power Insertion *(IEEE802.3af)*

PD Detection Signature *(IEEE802.3af)*

Product Description & Features -- Continued

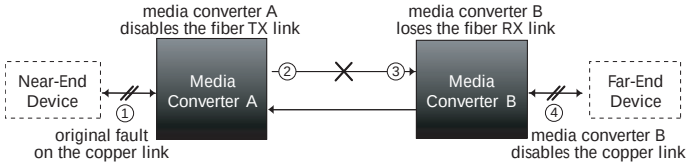
Product features -- continued

Over Current Protection/Under Current Detection *(IEEE802.3af)*

Link Pass-Through

The Link Pass-Through allows the media converter to monitor both the fiber and copper RX *(receive)* ports for loss of signal. In the event of a loss of an RX signal on one media port, the media converter will automatically disable the TX (*transmit)* signal of the other media port, thus, "passing through" the link loss.

The far-end device is automatically notified of the link loss, which prevents the loss of valuable data unknowingly transmitted over an invalid link. See diagram below.



Power Detect Reset

With the PSE/LTP switch enabled, a loss of the Fiber RX link will disable PSE power output on the UTP power for 2 seconds to allow the remote device to reinitialize.

Fiber redundancy

The LPS1000A-2SFP media converter has two fiber SFP ports: one can be configured as the primary port and one as the secondary port. When redundancy is enabled *(SW14 Down, model LPS1000A-2SFP)*, any fault on the primary port results in the secondary port becoming operational. When redundancy is disabled, the device operates as a three-port switch.

Full-Duplex network

In a full-duplex network, maximum cable lengths are determined by the type of cables that are used. *(The 512-Bit Rule does not apply in a full-duplex network.)*

Half-Duplex network *(512-Bit Rule)*

In a half-duplex network, the maximum cable lengths are determined by the round trip delay limitations of each Fast Ethernet collision domain. *(A collision domain is the longest path between any two terminal devices, e.g., a terminal, switch, router, etc.)*

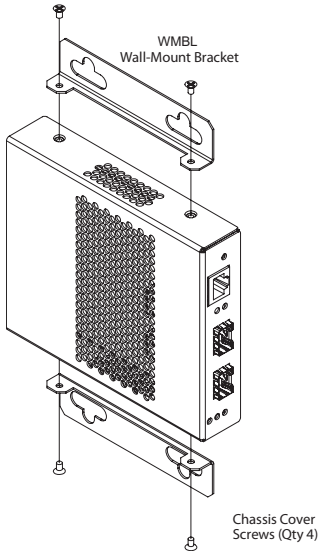
The 512-Bit Rule determines the maximum length of cable permitted by calculating the round-trip delay in bit-times (BT) of a particular collision domain. If the result is less than or equal to 512 BT, the path is good.

Enclosure Mounting

Optional vertical wall mounting

CAUTION: Make sure that the hardware used for wall mounting can support the weight of the LPS1000A once mounted. Failure to observe this caution could result in damage to the equipment.

1. Orient the device as shown in the illustration below.
2. Remove the two #4 Philips head screws securing the cover to the device.
3. Position one side of the bracket assembly as shown in the illustration and mount it to the device, using the the two #4 Philips head screws.
4. Do Steps 1 thru 3 to mount the bracket to the other side of the device.
5. Position the device on the mounting surface.
6. Mount the device to the wall.

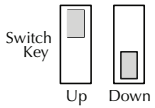


DIP Switches

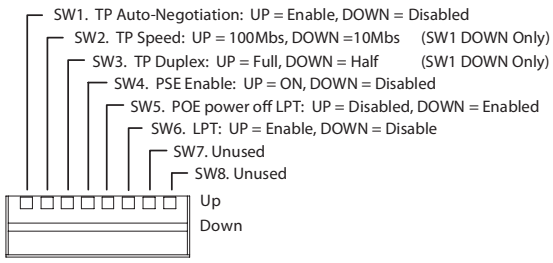
CAUTION: All installation and service must be performed by qualified service personnel. Read and follow all warning notices and instructions marked on the product and included in this manual.

Setting the configuration switches

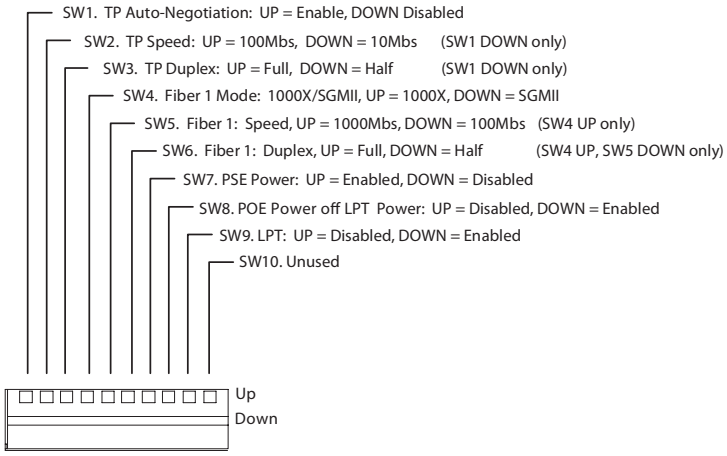
The configuration switches are located on the back panel of the LPS1000A media converters. Use a small, flat-blade screwdriver to set the switches.



LPS1000A-MM/-SM


SW1. TP Auto-Negotiation: UP = Enable, DOWN = Disabled
SW2. TP Speed: UP = 100Mbs, DOWN =10Mbs (SW1 DOWN Only)
SW3. TP Duplex: UP = Full, DOWN = Half (SW1 DOWN Only)
SW4. PSE Enable: UP = ON, DOWN = Disabled
SW5. POE power off LPT: UP = Disabled, DOWN = Enabled
SW6. LPT: UP = Enable, DOWN = Disable
SW7. Unused
SW8. Unused
Up
Down

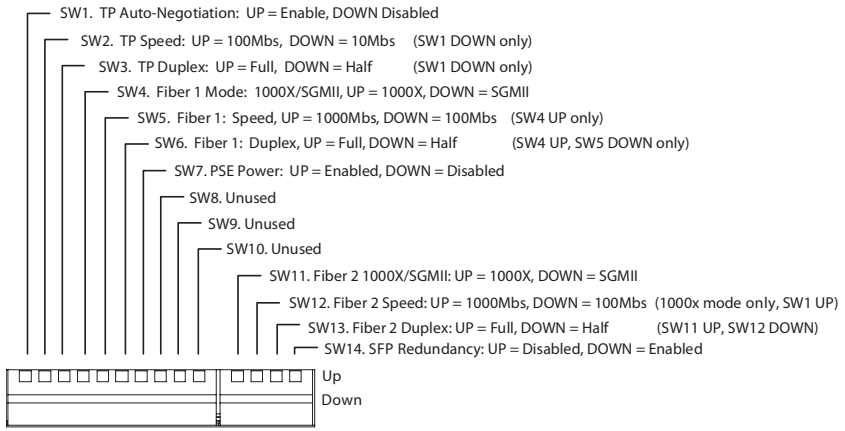
LPS1000A-1SFP


SW1. TP Auto-Negotiation: UP = Enable, DOWN Disabled
SW2. TP Speed: UP = 100Mbs, DOWN = 10Mbs (SW1 DOWN only)
SW3. TP Duplex: UP = Full, DOWN = Half (SW1 DOWN only)
SW4. Fiber 1 Mode: 1000X/SGMII, UP = 1000X, DOWN = SGMII
SW5. Fiber 1: Speed, UP = 1000Mbs, DOWN = 100Mbs (SW4 UP only)
SW6. Fiber 1: Duplex, UP = Full, DOWN = Half (SW4 UP, SW5 DOWN only)
SW7. PSE Power: UP = Enabled, DOWN = Disabled
SW8. POE Power off LPT Power: UP = Disabled, DOWN = Enabled
SW9. LPT: UP = Disabled, DOWN = Enabled
SW10. Unused
Up
Down

Installation -- Continued

Setting the configuration switches -- continued

LPS1000A-2SFP

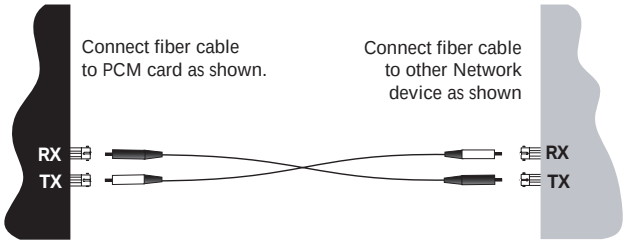

SW1. TP Auto-Negotiation: UP = Enable, DOWN Disabled
SW2. TP Speed: UP = 100Mbs, DOWN = 10Mbs (SW1 DOWN only)
SW3. TP Duplex: UP = Full, DOWN = Half (SW1 DOWN only)
SW4. Fiber 1 Mode: 1000X/SGMII, UP = 1000X, DOWN = SGMII
SW5. Fiber 1: Speed, UP = 1000Mbs, DOWN = 100Mbs (SW4 UP only)
SW6. Fiber 1: Duplex, UP = Full, DOWN = Half (SW4 UP, SW5 DOWN only)
SW7. PSE Power: UP = Enabled, DOWN = Disabled
SW8. Unused
SW9. Unused
SW10. Unused
SW11. Fiber 2 1000X/SGMII: UP = 1000X, DOWN = SGMII
SW12. Fiber 2 Speed: UP = 1000Mbs, DOWN = 100Mbs (1000x mode only, SW1 UP)
SW13. Fiber 2 Duplex: UP = Full, DOWN = Half (SW11 UP, SW12 DOWN)
SW14. SFP Redundancy: UP = Disabled, DOWN = Enabled
Up
Down

Cable & Power Connections

CAUTION: Associated Ethernet wiring shall be limited to inside the building. Failure to observe this caution could result in damage to the connected equipment.

Installing the fiber cable

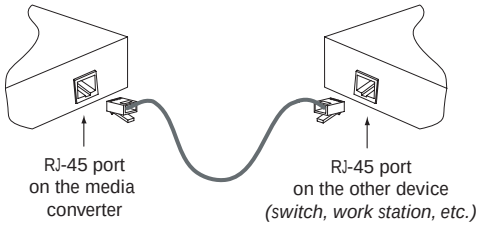
1. Locate a 100Base-FX fiber cable with male, two-stranded TX to RX connectors installed at both ends. See Figure below.
2. Connect the fiber cables to the LPS1000A media converter as described:
   - Connect the male TX cable connector to the female TX port.
   - Connect the male RX cable connector to the female RX port.
3. Connect the fiber cables to the other device as described:
   - Connect the male TX cable connector to the female RX port.
   - Connect the male RX cable connector to the female TX port.



Cable & Power Connections -- Continued

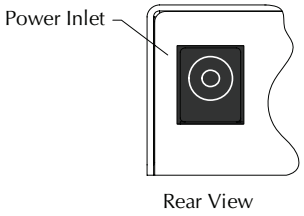
Installing the copper cable

1. Locate 10/100/100Base-TX copper cables with male, RJ-45 connectors installed at both ends. See Figure below.
2. Connect the RJ-45 connector at one end of the cable to the RJ-45 port on the media converter.
3. Connect the RJ-45 connector at the other end of the cable to the RJ-45 port on the other device *(wireless access point, VoIP phone, network camera, etc.)*.



Connecting power

1. Insert the barrel connector of the power adapter into the power port of the barrel connector.
2. Plug the power adapter plug into AC power and the power LED on the front panel should turn ON.



Internal Jumpers

Power over Ethernet (PoE)

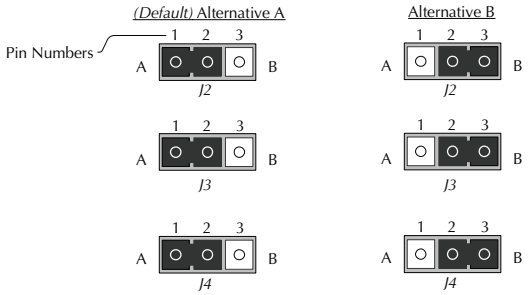
The LPS1000A media converter transmits electrical power along with data to remote devices over standard twisted-pair cable in an Ethernet network.

Note: Legacy powered devices that are not IEEE802.3af compliant can be power provided that the polarity matches that list below.

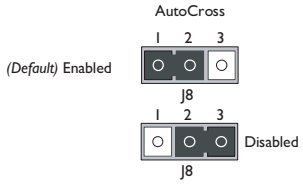
There are two modes of transmitting 48VDC PoE as defined in IEEE 802.3af: Alternative A *(default)* uses pins 1&2(+), 3&6(-) to transmit data and power. Alternative B uses pins 4&5(+), 7&8(-) to transmit power without data. These are the spare pairs in 10BASE-T and 100BASE-TX device configurations; therefore, Mode B requires a 4-pair cable.

To set A or B PoE alternatives, do the following:

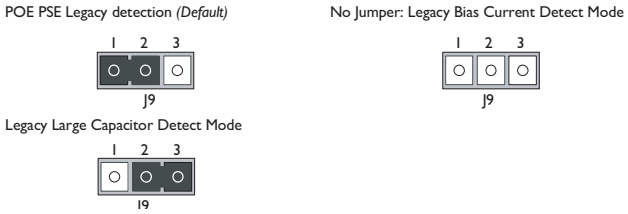
1. Remove the 4 screws on the and then remove the cover from the media converter.
2. Locate the 3 header connects J2, J3, and J4 on the circuit board.
3. Set jumpers 2, 3, and 4 to the same side, either (A or B). See diagram below.



AutoCross



POE PSE legacy detection



Operation

LEDs

See individual LPS1000A faceplate for LED placements. The table below explains what the LED functions indicate.

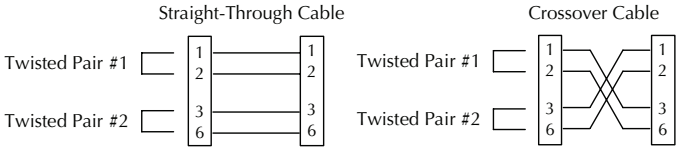
LEDs	Description	
TP Link/Activity	Green: Yellow:	1000Mbs: ON link, BLINK activity 10 or 100Mbs: ON link, BLINK activity
TP Duplex	Green: Yellow:	Full duplex Half duplex
TP PSE	Green: OFF: ON Steady: 1 flash: 2 flashes: 5 flashes:	Flashing indications every 1.2 seconds Not powering an end device Powering an end device End device signature resistance is to low *(300 ohm to 15K ohm detected)* End device signature resistance is to high *(33K ohm to 500K ohm detected)* Power overload fault
Fiber Link/Activity	Green Yellow	1000Mbs: ON link, BLINK activity 10 or 100Mbs: ON link, BLINK activity
Power	Green	Power ON

Cable Specifications

The physical characteristics must meet or exceed IEEE 802.3™ specifications.

Copper cable

Category 5: *(Minimum Requirement)*
Gauge: 24 to 22 AWG
Attenuation : 22.0 dB /100m @ 100 MHz
- Straight-through OR crossover twisted-pair cable may be used.
- Shielded twisted-pair (STP) OR unshielded Twisted-pair (UTP) may be used.
- Pins 1&2 and 3&6 are the two active pairs in an Ethernet network .
- RJ-45 Pin-out: Pin 1 = TD+, Pin 2 = TD-, Pin 3 = RD+, Pin 6 = RD-
- Use only dedicated wire pairs for the active pins:
  (e.g., blue/white & white/blue, orange/white & white/orange, etc.)
- Do not use flat or silver satin wire.



Fiber cables

Bit Error Rate:	$<10^{-9}$	
Single mode fiber *(recommended)*:	9 µm	
Multimode fiber *(recommended)*:	62.5/125 µm	
Multimode fiber *(optional)*:	100/140, 85/140, 50/125 µm	
LPS1000A-MM	850 nm multimode	
Fiber-optic Transmitter Power:	min: -9.5 dBm	max: -4.0 dBm
Fiber-optic Receiver Sensitivity:	min: -17.0 dBm	max: 0.0 dBm
Link Budget:	7.5.0 dB	
LPS1000A-SM	1310 nm multimode	
Fiber-optic Transmitter Power:	min: -9.5 dBm	max: -3.0 dBm
Fiber-optic Receiver Sensitivity:	min: -20.0 dBm	max: -3.0 dBm
Link Budget:	10.5 dB	

Technical Specifications

For use with Black Box Model LPS1000A or equivalent:

Standards:	IEEE 802.3, IEEE 802.3af
Data rate:	10/100/1000 Mb/s
Packet size *(Max)*:	1632 bytes untagged, 1628 bytes tagged
Mac address:	8K
Dimensions:	5.1" x 4.3" x 1" *(129.54mm x 109.2mm x 25.4mm)*
Weight:	2 lbs. *(0.90 kg)* approximately
Power consumption:	20W max
Power supply:	Power Adaptor *(supplied)*: Input 100-250 VAC
PSE power output:	15.4W
Environment	
Ambient temp:	0 to 40°C *(32 to 104°F)*
Storage temp:	-25 to 85°C *(-13 to 185°F)*
Humidity:	5 to 95%, non-condensing
Altitude:	0 to 10,000 feet
MTBF*:	42,053 MIL217F2 Hours 115,646 Bellcore Hours
Warranty:	Lifetime

WARNING: Visible and invisible laser radiation when open. Do not stare into the beam or view the beam directly with optical instruments. Failure to observe this warning could result in an eye injury or blindness.

WARNING: Use of controls, adjustments or the performance of procedures other than those specified herein may result in hazardous radiation exposure.

*MTBF is estimated using the predictability method. This method is based on MIL-217F and Bellcore standards at 40°C ambient temperature, typical enclosure heat rise of 10°C, and nominal operating conditions and parameters. Installation and configuration specific MTBF estimates are available upon request. Contact Technical Support.

Technical Specifications -- continued

IMPORTANT: Copper based media ports, e.g., Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are intended to be connected to intra-building *(inside plant)* link segments that are not subject to lightening transients or power faults. Copper based media ports, e.g., Twisted Pair (TP) Ethernet, USB, RS232, RS422, RS485, DS1, DS3, Video Coax, etc., are NOT to be connected to inter-building *(outside plant)* link segments that are subject to lightening transients or power faults. Failure to observe this caution could result in damage to equipment.

Troubleshooting

If the media converter fails, isolate and correct the fault by determining the answers to the following questions and then take the indicated action:

1. Is the media converter power LED ON?
   NO:
   - Is the barrel connector fully inserted into the media converter?
   - Is the adapter plugged into an AC outlet; if not, plug it into the outlet.
   - Is the AC outlet active; if not, check the outlet's circuit beaker?
   - Contact 24-hour technical support : 1-724-746-5500

   YES
   - Proceed to step 2.

2. Is the POE LED ON?
   NO
   - Is there an active *(connected to anther device)* RJ-45 cable inserted into the media converter's TX port; if not, insert the cable accordingly.
     Is the power turned ON to the other device?
   - Contact 24-hour technical support : 1-724-746-5500

   YES
   - Go to step 3.

3. Is the TX LACT LED ON
   NO
   - Check the twisted pair cables for proper installation in the device at both ends.
   - Disconnect and reconnect the twisted pair cable to restart the initialization process.
   - Restart the attached device to restart the initialization process.
   - Check that the AutoCross switch is in the UP position *(enabled)*.
   - Contact 24-hour technical support : 1-724-746-5500

   YES
   - Go to step 4.

Troubleshooting -- continued

4. Is the FL LINK LED ON?
   NO
   - Check the fiber cables for proper connection.
   - Verify that the TX and RX cables on the media converter are connected to the RX and TX ports, respectively, on the other device.
   - Disconnect and reconnect the fiber cable to restart the initialization process.
   - Restart the attached device to restart the initialization process.
   - Contact 24-hour technical support : 1-724-746-5500

   YES
   - Proceed to step 5.

5. Is data being passed through the device?
   NO
   - Ensure the Powered Device (PD) IEEE 802.3af compliant.
   - Ensure the load to the Powered Device (PD) is less than 0.4 Amp.
   - Is a data source connected; if not, connect a data source to the media converter.
   - Is the data source active; if not, start sending data.
   - Are the FX and TX LACT LEDs flashing?
   - Contact 24-hour technical support : 1-724-746-5500

Declaration of Conformity

Declaration of Conformity

Name of Mfg:	Black Box Corporation 1000 Park Drive, Lawrence PA U.S.A.
Model:	LPS1000A Series Media Converters
Part Number(s):	LPS1000A-MM, LPS1000A-SM, LPS1000A-1SFP, LPS1000A-2SFP
Regulation:	EMC Directive 89/336/EEC

Purpose: To declare that the LPS1000A to which this declaration refers is in conformity with the following standards.

CISPR22:2005 + A1:2005; EN55022:2006 Class A; EN55024:1998+A1:2001+A2:2008

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive(s) and Standard(s).

Stephen Anderson, Vice-President of Engineering

June, 2008
Date

Contact Us

Address

Black Box Corporation
1000 Park Drive
Lawrence, PA 15055-1018
Toll free: 877-877-2269

Technical support

Technical support is available 24 hours a day.

U.S.A.: 1-724-746-5500

Compliance Information

CE Mark

FCC regulations

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

Canadian regulations

This digital apparatus does not exceed the Class A limits for radio noise for digital apparatus set out on the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Class A prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

European regulations

Warning

This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Achtung !

Dieses ist ein Gerät der Funkstörgrenzwert klasse B. In Wohnbereichen können bei Betrieb dieses Gerätes Rundfunkstörungen auftreten. In diesem Fäll ist der Benutzer für Gegenmaßnahmen verantwortlich.

Attention !

Ceci est un produit de Classe A. Dans un environment domestique, ce produit risque de créer des interférences radioélectriques, il appartiendra alors à l'utilsateur de prende les measures spécifiques appropriées.

In accordance with European Union Directive 2002/96/EC of the European Parliament and of the Council of 27 January 2003, Black Box will accept post usage returns of this product for proper disposal. The contact information for this activity can be found in the 'Contact Us' portion of this document.

CAUTION: RJ connectors are NOT INTENDED FOR CONNECTION TO THE PUBLIC TELEPHONE NETWORK. Failure to observe this caution could result in damage to the public telephone network.

Der Anschluss dieses Gerätes an ein öffentlickes Telekommunikationsnetz in den EG-Mitgliedstaaten verstösst gegen die jeweligen einzelstaatlichen Gesetze zur Anwendung der Richtlinie 91/263/EWG zur Angleichung der Rechtsvorschriften der Mitgliedstaaten über Telekommunikationsendeinrichtungen einschliesslich der gegenseitigen Anerkennung ihrer Konformität.

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